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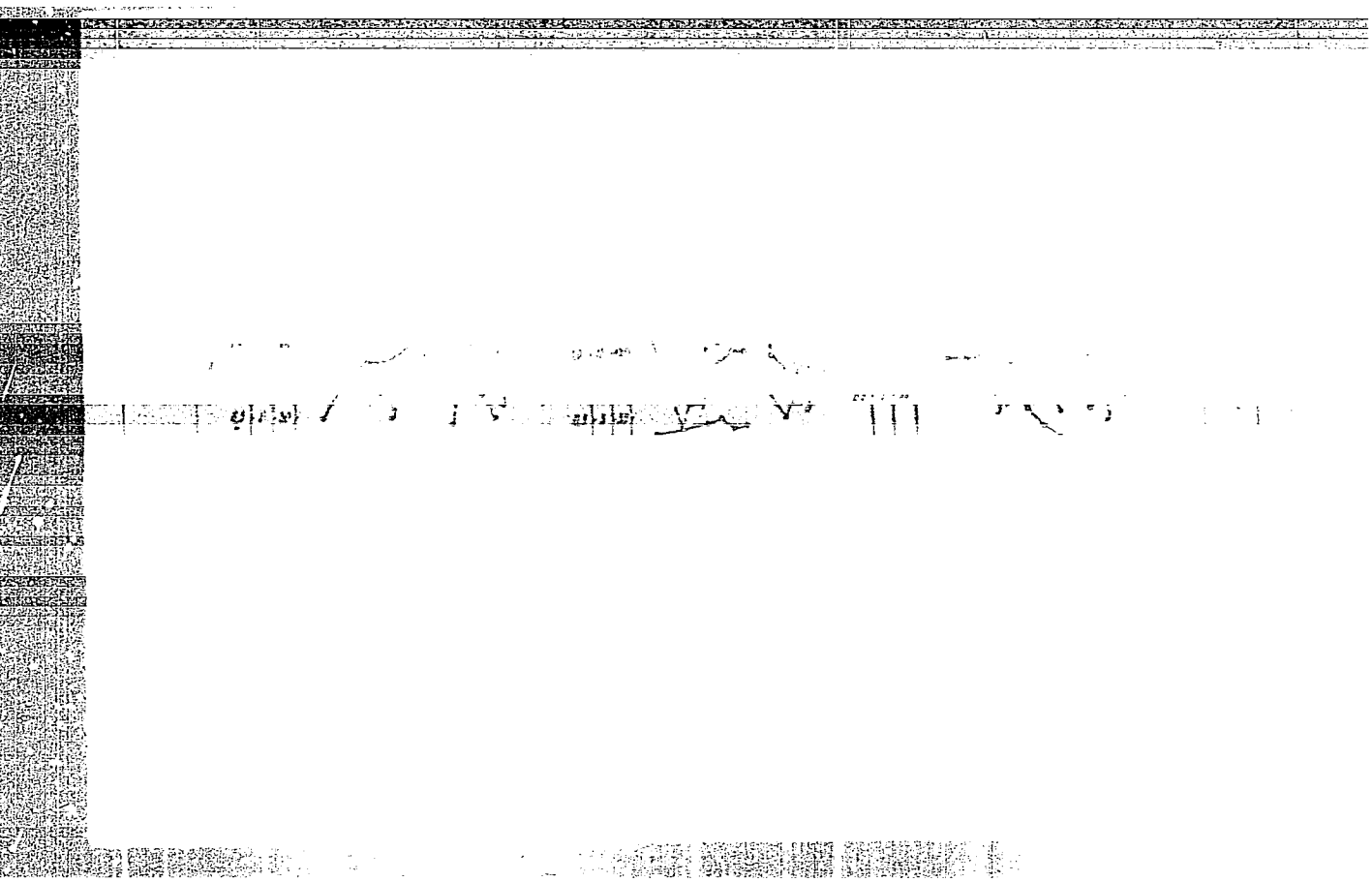
B.B. Tenorov

cardiogram and seismocardiogram indices, has some individual peculiarities but generally did not differ from analogous preflight data. This indicated that



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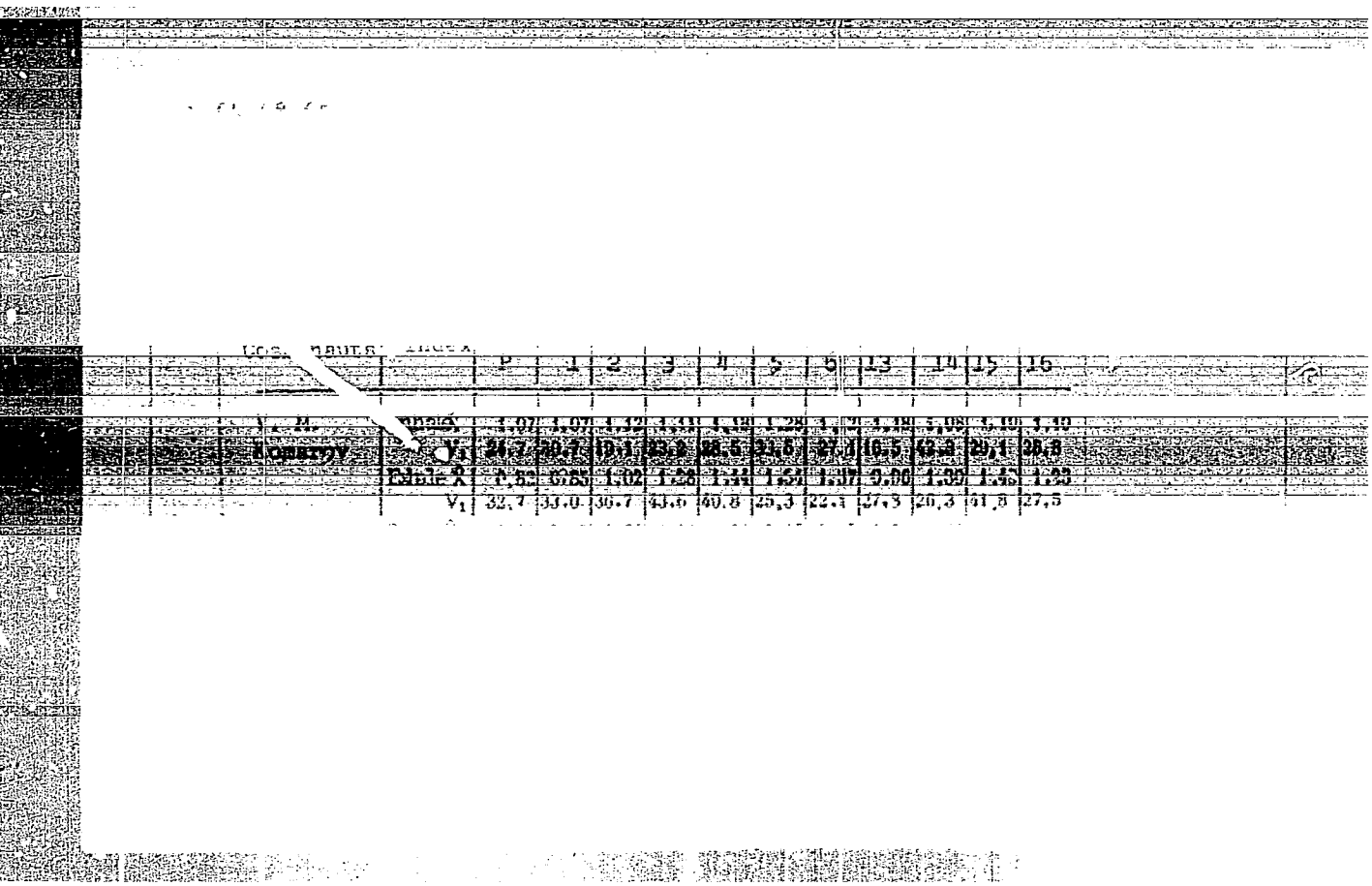

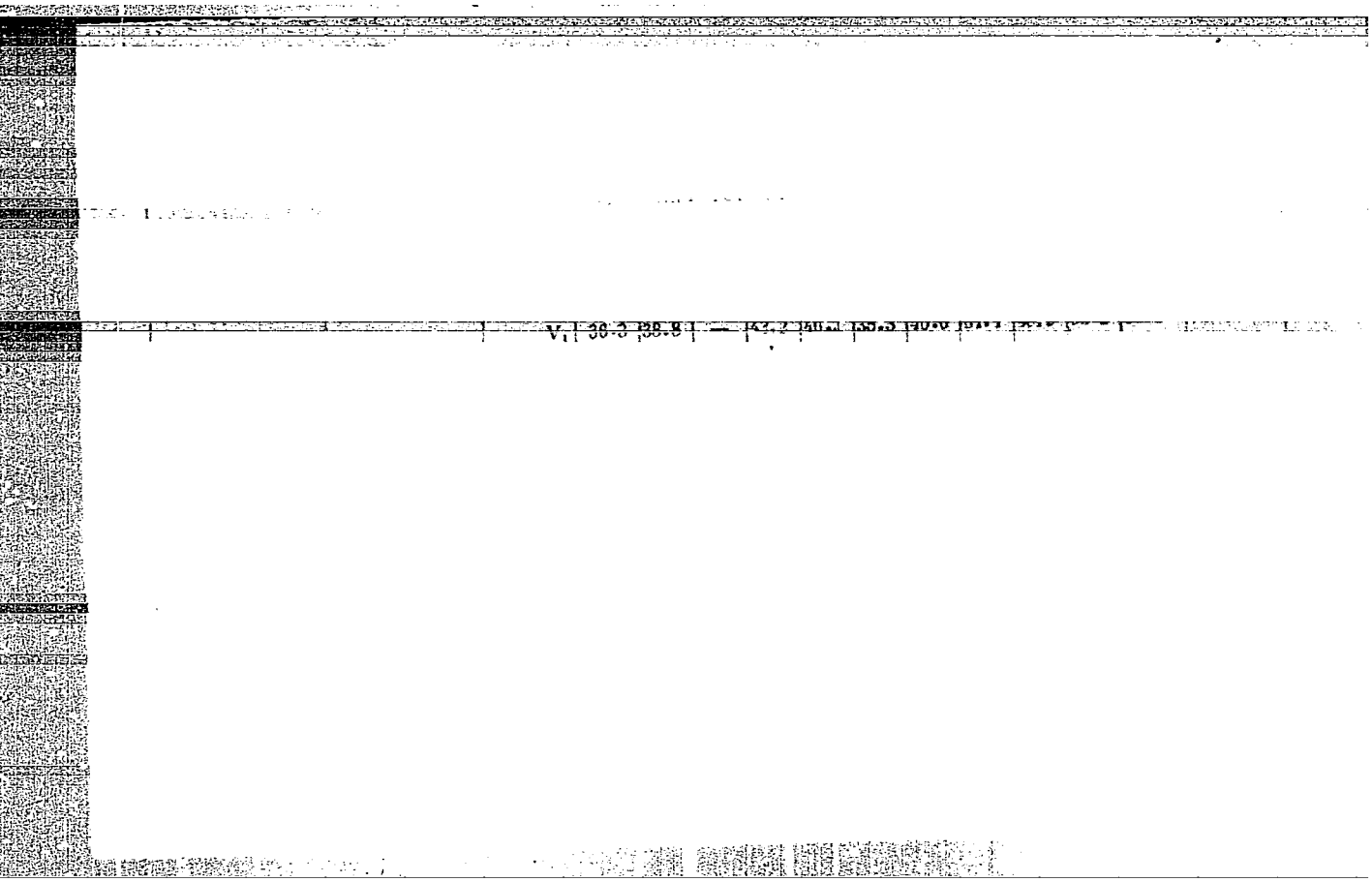

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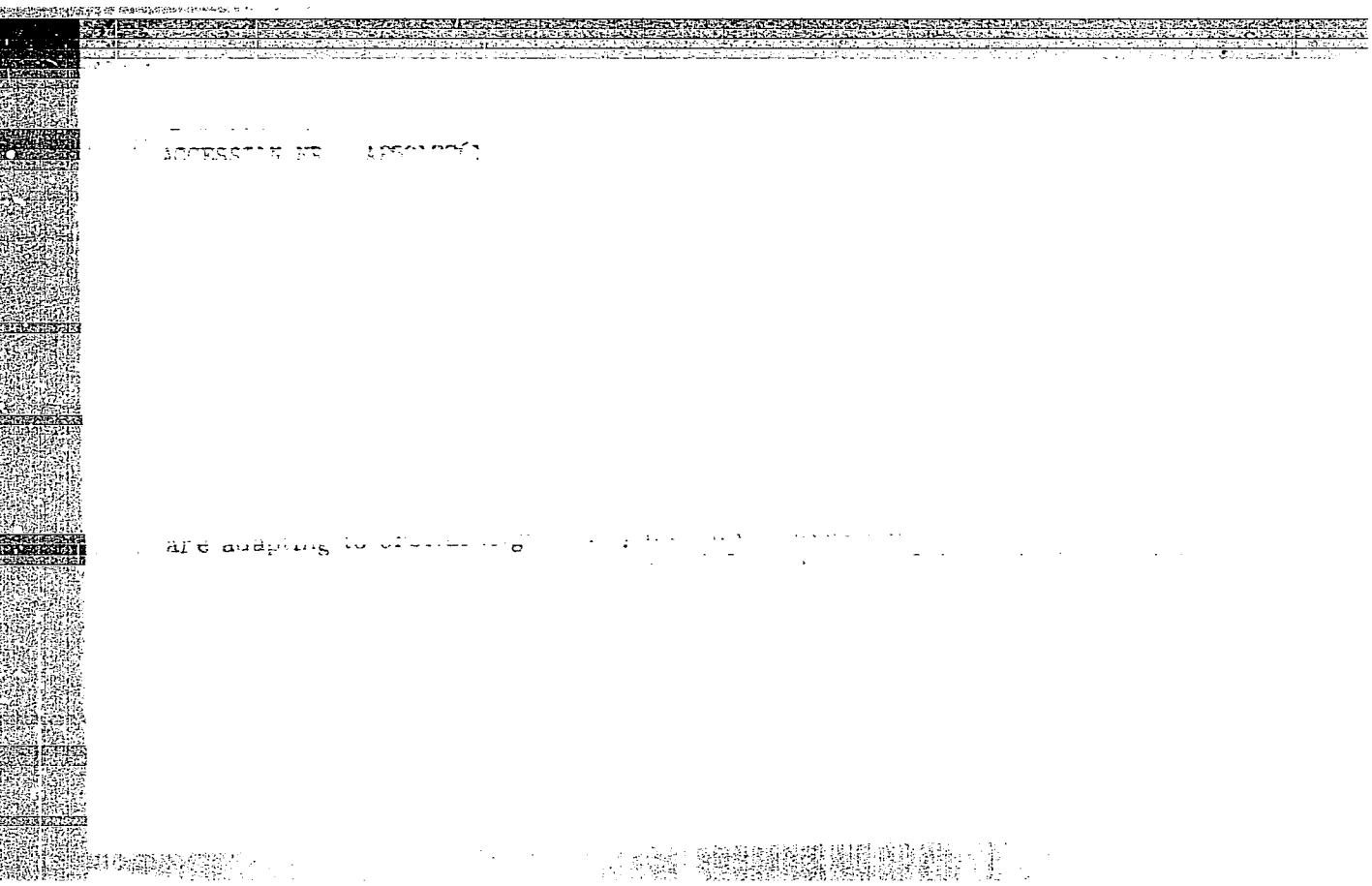

ACC NR: AP5024151 SOURCE CODE: UR/0216/65/000/005/0633/0646

AUTHOR: Kas'yan, I. I.; Krasovskiy, A. S.; Kolosov, I. A.; Lomova, M. A.; Lebedev, V. I.; Yurov, B. N.

ORG: none

TITLE: Some physiological reactions of man to short-term weightlessness

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 5, 1965, 633-646

TOPIC TAGS: weightlessness, parabolic flight, human physiology, vestibular analyzer

ABSTRACT: Experiments were conducted with the participation of 31 men (aged 23—38 yr) representing various professions. The subjects were subdivided into 4 groups according to profession. Parabolic flights took place on a jet aircraft where weightlessness could be produced for 40—50 sec. Examinations took place before and after weightlessness and g-forces were 2.5—3.5 g with 2—3 min breaks between parabolas. In all, 120 flights representing 360 parabolas were flown. During the flights, the bioelectricity of the brain (EEG), heat biopotentials (EKG), respiration rate, blood composition, and vestibular reactions were studied. Results are given in Figs. 1 and 2 and Tables 1 and 2. It was concluded that periodic parabolic flights are useful in acquainting cosmonauts with short-term weightlessness and establishing criteria for selecting space-flight crews. No pathological alterations in physiological function or radical deviations in blood morphology or biochemistry were noted as a result of parabolic flights.

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UDC: 629.195:612.829.3

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ACC NR: AP5024151

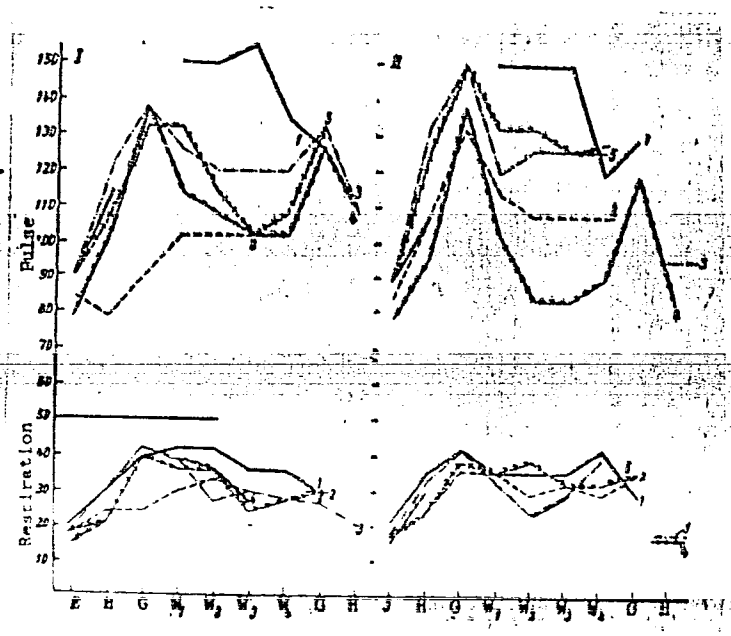

Fig. 1. Change in pulse and respiration rate of a subject at various stages of parabolic flight.

I - First parabola; II - third parabola; 1—5 - sequence of flights; E - Earth; H - horizontal flight; G - g-load; W - weightlessness (W_1 - 10 sec; W_2 - 20 sec; W_3 - 30 sec; W_4 - 40 sec).

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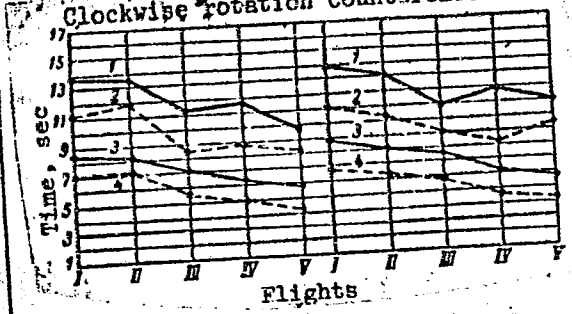

Fig. 2. Duration of postrotational nystagmus (1 - before, 2 - after flight) and counterrotation illusions (3 - before, 4 - after flight) during the performance of a Voyachek otolithic probe

Table 1. Changes in respiration rate at various stages of parabolic flight (compared with horizontal flight prior to weightlessness)

Change in resp. rate	G load	Weightlessness			G load	Horizontal flight
		I parab.	II parab.	III parab.		
Increase	11	9	7	—	8	—
No change	14	19	20	8	13	15
Decrease	3	3	4	—	2	11
No. investigated	28	31	31	8	23	26

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Table 2. Content of nonesterized fatty acids during parabolic flights (milliequivalents/liter)

Subject No.	1963 flight data	Before flight	After 1st flight	After 2nd flight	Comments
1	12	630	1550*	—	1. No flight before first test
	23	380	660*	660*	"
	12	200	1390*	—	
	16	—	270	260	2. First test after normal flight
	17	—	220	310*	3. Flight before first test
2	24	320	380*	—	4. No flight before first test
	16	—	290	260*	5. 3 flights before first test
3	23	260	120*	—	6. No flights before first test
	24	—	320	430*	7. 1 flight before first test
4	17	280	250*	—	8. No flights before first test
	26	200	270*	430*	"
	17	440	550*	470	"
5	23	200	320*	—	
	24	—	320	760*	9. First test after normal flight
	17	—	440*	270	"
6	23	370	530*	—	10. No flights before first test
7	26	—	320	300*	11. First test after normal flight

* Flights simulating weightlessness

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L 3925-66
ACC NR: AP5024151

After the first exposure to parabolic flight, it was common for the concentration of nonesterized fatty acids to increase. Criteria indicating sufficient stability to short-term weightlessness are: insignificant changes in pulse rate relative to normal values during weightlessness, abbreviated illusions of counterrotation and postrotational nystagmus after a series of parabolic flights, and the absence of unfavorable sensory and vestibular autonomic reactions characterized by spatial illusions, giddiness, or nausea. Orig. art. has: 5 tables and 4 figures. [CD]

SUB CODE: L8/ SUBM DATE: 27May65/ ORIG REF: 024/ OTH REF: 013/ ATD PRESS: 4120

Card 5/5

YUGANOV, Ye.M.; GORSHKOV, A.I.; KASIYAN, I.I.; BRYANOV, I.I.; KOLOSOV, I.A.; KOPANEV, V.I.; LEBEDEV, V.I.; POPOV, N.I.; SOLODOVNIK, F.A.

Vestibular reactions of astronauts during the "Voskhod" spaceship flight. Izv. AN SSSR. Ser. biol. no.6:877-883 N-D '65. (MIRA 18:11)

L 10805-66 FSS-2/EWI(1)/FS(v)-3 MJ/RD

ACC NR: AP6000254 SOURCE CODE: UR/0209/65/000/011/0027/0032

AUTHOR: Kas'yan, I.; Kopanev, V.; Lebedev, V.; Khlebnikov, G.; Kolosov, I.

ORG: none

TITLE: On an airplane in a state of weightlessness. Results of research

SOURCE: Aviatsiya i kosmonavtika, no. 11, 1965, 27-32

TOPIC TAGS: human physiology, space physiology, weightlessness, parabolic flight

ABSTRACT: Cosmonaut training flights in aircraft equipped with a weightlessness tank are described. Some physiological parameters of the trainees during various stages of the flight are discussed. One series of tests performed on a dynamometer showed that, compared to horizontal flights, during weightlessness the amount of maximum muscular force which can be exerted is reduced by 6—12 kg for the right hand and 4—12 kg for the left hand. This decrease in muscular force is probably connected with the decreased tonus of the skeletal muscles and functional changes in the central nervous system during weightlessness. The coordinograph, a device for measuring changes in fine coordination movements, recorded the total work time for each test, the number of errors, and the time of one movement. Although no disruption in coordination was observed when these tests were conducted during parabolic flight, most cosmonauts showed some lag in the speed of execution of motor acts. Orig. art. has: 2 figures. [JS]

SUB CODE: 06 SUBM DATE: none/

Card 1/1

KAS YAN, I.I.; KOPANEV, V.I.

Physiological mechanisms of the effect of weightlessness on the human organism. Izv. AN SSSR Ser. biol. 30 no.1:10-17 Ja-F '65. (MIRA 18:2)

KAS'YAN, I.; KOLOSOV, I.; KOPANEV, V.; LEBEDEV, A.; [illegible]

With an airplane into weightlessness; results of research.
Av. i kosm. 48 no.12:27-30 N '65.

(MIRA 19:1)

17411-66 EEC(k)-2/EWT(1)/EWA(d)/FSS-2 SCTB TT/DD/RD/GW

ACC NR: AP6003450 SOURCE CODE: UR/0216/66/000/001/0003/0013

AUTHOR: Kas'yan, I. I.; Kolosov, I. A.; Kopanev, V. I.; Lebedev, V. I.

30
B

ORG: none

TITLE: Physiological reactions of cosmonauts in free space

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 1, 1966, 3-13

TOPIC TAGS: Voskhod 2, parabolic flight, Leonov, Belyayev, weightlessness effect, acceleration effect, nystagmus, motor analyzer

2

ABSTRACT: The physiological effects of the various training programs in preparation for the Voskhod-2 flight were studied, with special attention given to EVA operations during parabolic flights which lasted 25—30 sec. These exercises by both Leonov and Belyayev took place in a mockup of Voskhod-2 which was situated in the cabin of the flying laboratory. Prior to each operation, Leonov had to locate his backpack containing the automatic life-support systems, attach it to himself, check out the hardware with Belyayev, and equalize the air-lock and cabin pressure. After this, he would enter the air-lock, don his hermetic helmet, check the position of the light filters, the oxygen supply, and the spacesuit for leaks. Belyayev would then close the cabin hatch, depressurize the air-lock, and open its hatch through which Leonov would then egress. Leonov would then conduct as many egress and return operations as necessary. It was found that to perfect moving through the lock

UDC: 612:629.195.2

Card 1/8

took no less than 2—3 parabolic flights. The results of these tests are shown in Table 1. To perfect approach and especially egress required considerable practice; Leonov required 6 practice egresses and 4 practice approaches. His first three egress operations took 19—20 sec in contrast to 6—8 sec in subsequent runs. Leonov's impressions during one of the last training flights were as follows: "The flight went well. I did not feel any uncomfortable sensations. They were the same as those experienced in earlier flights. The spacesuit limits movements somewhat, and the helmet limits the visual field. The approach to the lock was easily executed since pulling on the umbilicus provided fulcrum and established the direction of motion. Approaches and egresses can be smoothly executed. Apparently, any operation can be completed during weightlessness without noticeable disruption of coordination when there is the smallest point of support." Some results of physiological observations made during training flights are given in Table 2, which shows some differences in the reactions of the cosmonauts. Table 3 shows that cardiovascular reactions were as expected. Motor activity studied during the training flights showed that Leonov had a tendency to take slightly longer than normal to complete various operations during acceleration and weightlessness, as shown in Table 4. The results of vestibular tests before and after training flights are given in Table 5; they demonstrated that the vestibular stability of Leonov and Belyayev was sufficiently high. It was concluded that the need for the on-the-ground modeling of cosmonaut activities has increased and has the need for space-craft and space-station mockups which can be used during parabolic flights. These

Table 1. Proficiency of egresses from and approaches to the lock by cosmonaut A. A. Leonov during parabolic flights on a special aircraft

Egress from the lock			Approach to the lock		
Repetitions	Time, sec	Proficiency	Repetitions	Time, sec	Proficiency
1	20	Turn backwards	1	6	Approach to the side
2	19	Turn to the side	2	7	The same
3	20	" "	3	6	" "
4	16	Turn forward	4	10	Smooth approach, without turn
5	12	Turn to the side	5	10	The same
6	12	Smooth egress, without turn	6	10,7	" "
7	8	The same	7	9	" "
8	8	" "	8	10	" "
9	12	" "	9	10	" "
10	8	" "	10	10	" "
11	5	" "	11	10	" "
12	5	" "	12	7	" "
13	10	Slight turn to the side	13	6	Approach to the side
14	8	Slight turn backwards	14	9	Smooth approach, without turn
15	5	Smooth egress, without turn	15	9	The same
16	6	The same	16	6	" "
17	6	" "	17	5	" "
18	8	" "	18	6	" "
19	6	" "	19	8	" "
20	6	" "	20	6	" "

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Table 2. Reactions of cosmonauts P. I. Belyayev and A. A. Leonov before, during, and after parabolic flight

Cosmonauts	Flight No.	Before flight: Coloring of facial skin	Before flight: Motor activity	Before flight: Speech activity	During flight: Coloring of facial skin	During flight: Motor activity	During flight: Speech activity	During flight: Quality of performance of the flight program	After flight: Coloring of facial skin	After flight: Motor activity	After flight: Speech activity
P. I. Belyayev	1	Normal			Normal	Decreased	Decreased	Slowly, confidently	Normal	Decreased	Decreased
	2					Normal	Normal	Rapidly, confidently		Normal	Normal
	3					»	»	The same		»	»
A. A. Leonov	1				Hyperemia	Increased	Increased	Rapidly, confidently	Hyperemia	Increased	Increased
	2		»		»	»	Normal	The same	Moderate hyperemia	»	
	3				Normal	Normal	»	» »	Normal	Normal	

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Table 3. Change of pulse and respiration rates in cosmonauts during training flights on a weightlessness parabola (In the numerator—ranges of variation in pulse rate, in the denominator—of respiration rate)

Cosmonauts	Flight No.	Before Flight	In flight				After flight
			Horizontal segment	Acceleration	Weightlessness	Acceleration	
Brief weightlessness (immobilization in working location)							
P. I. Belyayev	1	84—90 / 18—24	90—96 / 15—18	100—114 / 18—26	70—80 / 16—18	102—120 / 19	84 / 18
A. A. Leonov	1	54—60 / 21—24	66—72 / 18—24	84 / 18	60—70 / 18—21	84 / 24	66 / 18
Brief weightlessness (perfecting elements of egress and ingress)							
P. I. Belyayev	1	64 / 12	72—78 / 14—14	80—88 / 16—16	76—78 / 14—14	84—88 / 16—18	70 / 12
	7	68 / 12	70—88 / 12—16	80—100 / 14—20	76—88 / 12—16	80—100 / 14—20	78 / 12
A. A. Leonov	1	68 / 12	76—90 / 14—22	80—102 / 16—24	76—80 / 14—20	80—108 / 18—28	80 / 14
	7	64 / 12	70—84 / 12—14	80—90 / 14—16	78—84 / 12—14	82—96 / 14—16	76 / 12

Table 4. Data concerning the motor activity of cosmonauts during flights on Kepler's parabola (averaged data)

Cosmonauts	Total time of execution of complex movement on the coordinograph (sec)				Time of touching "pencil" to terminal of the coordinograph (sec)			
	On ground	During acceleration before weightlessness	During weightlessness	During acceleration after weightlessness	On ground	During acceleration before weightlessness	During weightlessness	During acceleration after weightlessness
P. I. Belyayev	4,8 4,72—4,88	3,98 —	4,29 4,08—4,50	3,16 —	0,56	0,27	0,34	0,27
A. A. Leonov	3,9 3,56—4,30	7,12 5,68—8,56	5,18 4,44—5,92	7,22 6,48—7,96	0,25	0,45	0,36	0,39

Note: Ranges of variations during execution of complex movements are listed in the denominator, and averaged data in the numerator.

Table 5. Change in the duration of postrotational nystagmus and counterrotational illusion (sec) before and after parabolic flights, by Kepler trajectory

Cosmonauts	Flight number	Postrotational nystagmus		Counterrotational illusion	
		Before flight	After flight	Before flight	After flight
P. I. Belyayev	1	12	10	10	7
	7	9	6	8	5
A. A. Leonov	1	15	12	12	11
	7	10	6	9	5

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ACC NR: AP6003450

flights would entail training cosmonauts to connect joints and conduct various repair operations both inside and outside (on the surface) the mockup (welding, cutting, and riveting, etc.). Orig. art. has: 6 tables and 4 figures. [CD]

SUB CODE: 06/ SUBM DATE: 18Aug65/ ORIG REF: 007/ ATD PRESS: 4206

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L 16033-66 FSS-2/EWT(1)/FS(v)-3/EEC(k)-2/EWA(d) SCTB WT/DD/RD/GW

ACC NR: AP6003452 SOURCE CODE: UR/0216/66/000/001/0021/0028

AUTHOR: Voskresenskiy, A. D.; Kas'yan, I. I.; Maksimov, D. G. 42

ORG: none B

TITLE: Changes in cardiac activity and respiration in cosmonauts during light physical work on the orbital flight of the Voskhod-1 spacecraft

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no. 1, 1966, 21-28

TOPIC TAGS: dynamometer, cardiac activity, respiratory activity, weightlessness effect, cosmonaut, Yegorov, Feoktistov, Komarov, EKG

ABSTRACT: In this article electrocardiograms, seismocardiograms, and pneumocardiograms recorded during work on a dynamometer by Voskhod-1 cosmonauts are presented. Work with the dynamograph consisted of a series of rapid, rhythmical compressions of a wrist dynamometer for approximately 1 min, using a force of 2—3 kg. Each cosmonaut worked on the instrument in a different phase of the flight; Yegorov in the 2nd orbit, Feoktistov in the 5th, and Komarov in the 13th. Recording physiological parameters during programmed work is a well-known necessity. During the flight all three cosmonauts experienced a slight increase in pulse and respiration rates while performing this light work.

Card 1/3 UDC: 629.195.2:612

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ACC NR: AP6003452

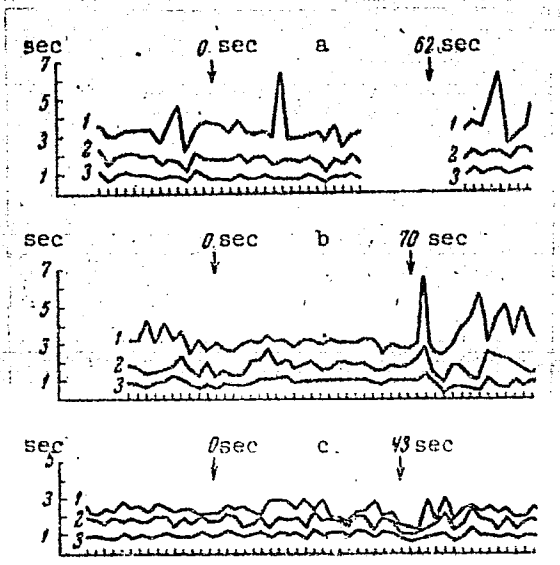

Fig. 1. Changes in the length of inspiration (3), in the total time of inspiration and expiration (2), and in the whole respiratory cycle (1) for cosmonauts V. M. Komarov (a), K. P. Feoktistov (b), and B. B. Yegorov (c).

The marks on the axis of the abscissas correspond to consecutive respiratory cycles. The arrows above the curves designate the beginning and end of work with the dynamometer.

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ACC NR: AP6003452

These reactions are considered the result of releasing influences of the nervous system, which accompany the beginning of work and the subsequent adaptation of respiratory and circulatory systems to the increasing oxygen requirement. A decrease in the variability of the R-R interval (EKG) was noted for cosmonauts Komarov and Feoktistov during work. In addition, a decrease in the length of their respiratory cycles was observed. These physiological shifts indicate that light physical work has a normalizing effect on cardiac and respiratory regulation during weightlessness. Yegorov, however, was affected differently: the variability of the R-R interval in his EKG increased during work. Periods of tachypnea showed up on Yegorov's pneumogram; the length of his respiratory cycle decreased to 2 sec (see Fig. 1). Analysis of dynamograms showed signs of Yegorov's rapid fatigue. His reactions are attributed to discomfort caused by spatial illusions. It is also possible that weightlessness directly affects external respiratory function. Orig. art. has: 4 figures. [JS]

SUB CODE: 06/ SUBM DATE: 23Jul65/ ORIG REF: 007/ OTH REF: 004/ ATD PRESS: 4263

Card 3/3

L 09276-67 EWT(1)/EWG(k)-2 SCTB IT/DD/GD/GS

ACC NR: AT6036472 SOURCE CODE: UR/0000/66/000/000/0018/0019

AUTHOR: Akulinichev, I. T.; Baykov, A. Ye.; Vasil'yev, P. V.; Kas'yan, I. I.; Maksimov, D. G.; Uglov, A. Ye.; Chekhonadskiy, N.A.

ORG: none

TITLE: Some data from electrophysiological investigations conducted on the crew of the Voskhod-2 during spaceflight (Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24-27 May 1966)

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 18-19

TOPIC TAGS: space physiology, manned space flight, Leonov, extravehicular activity, cardiology, cardiovascular system, electrooculogram, electrocardiogram, body temperature, electrophysiology, respiration, heart rate / Voskhod-2

ABSTRACT:

Electrocardiograms, pneumograms, seismocardiograms, and electro-oculograms were registered on the Voskhod-2 cosmonauts, Belyayev and Leonov. In addition, Leonov's body temperature was measured. After the spaceship attained orbit, the frequency of cardiac contractions continued to increase and to exceed the levels registered

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during active acceleration. These changes in pulse rate were due to the preparations for Leonov' s EVA. During EVA, their heart rates reached the maximums of 129 and 162 beats/min. By the third orbit, the heart rate and respiration frequencies of the two cosmonauts became normal, equaling prelaunch magnitude. Further changes were comparable to those noted in preceding flights. The lowest heart rates were recorded during the seventh orbit. From the thirteenth to the eighteenth orbit there was a gradual increase in the rate of cardiac contractions (86—111) and an increase in respiration rate up to 18—20 cycles/min, which was related to the performance of a series of tasks according to the program, and to the emotional strain induced by preparation for manual re-entry.

Analysis of the EKG indicated that the significance of the Q—T and R—R intervals in both cosmonauts corresponded to changes in frequency of the heart rate. The lability of the Q—T coefficient was higher at the beginning and end of the flight in both cosmonauts and diminished noticeably during the middle of the flight. The same was observed in relation to the amplitude of the EKG peaks. The duration of the mechanical systole in general followed changes in pulse rate from the third to the sixteenth orbit; the duration of Leonov' s mechanical systole varied from 0.32—0.35

sec. During the 17th and 18th orbits, the duration of the mechanical systole diminished to 0.29—0.27 sec simultaneously with an increase in the pulse rate. Electromechanical lag was determined only in Leonov and during various times of the flight varied from 0.02—0.06 sec.

Oculomotor activity during the first two orbits rose in both cosmonauts to 105—111 movements/min. During the third and fourth orbits the number of oculomotor reactions diminished and after that varied within relatively low limits: 10—40 movements/min. The dynamics of the electro-oculogram corresponded to changes in the pulse and respiration frequency and reflected, apparently, the general condition of the cosmonauts. An analysis of the amplitudes and the curve of the EOG indicated that eye movements in the cosmonauts were rather symmetrical during the entire duration of the flight.

Leonov's armpit temperature varied during the flight from 35—37.6°C. The higher temperatures were recorded during the 2nd, 16th, and the 17th orbits. This can be explained by emotional strain and performance of physical tasks by the cosmonaut. [W. A. No. 22; ATD Report 66-116]

SUB CODE: 06,22 / SUBM DATE: 00May66

L 10970-67 FSS-2/EWT(1) DD/OD

ACC NR: AT6036587 SOURCE CODE: UR/0000/66/000/000/0214/0215

33

AUTHOR: Kolosov, I. A.; Chekirda, I. F.; Lebedev, V. I.; Khlebnikov, G. F.; Kas'yan, I. I.

ORG: none

TITLE: Rotation tests as a method of detecting covert forms of motion sickness under conditions of weightlessness [Paper presented at the Conference on Problems of Space Medicine held in Moscow from 24 to 27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii, Moscow, 1966, 214-215

TOPIC TAGS: weightlessness, biologic acceleration effect, coriolis acceleration, motion sickness, diagnostic medicine, vestibular analyzer

ABSTRACT: Some Soviet cosmonauts (G. S. Titov, V. V. Nikolayeva-Tereshkova, K. P. Feoktistov, B. B. Yegorov) with adequately high vestibular analyzer resistance to motion sickness experienced vestibulo-autonomic discomfort under conditions of prolonged weightlessness. In this connection, the problem of exposing people suffering from vestibular disorders assumes the greatest significance. An attempt to identify latent forms of motion sickness more completely was undertaken.

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The methodological approach consisted of a modified Barani rotational test (10 rotations for 10 sec) during horizontal flight in a jet aircraft and during conditions of weightlessness (25 sec). During the first stage, the rotational test was conducted during the five sec after the beginning of stabilized weightlessness. In the second stage, the same people were rotated at the beginning of the transition period from 2 G to 0 G for 5 sec and then for an additional 5 sec during the beginning of weightlessness.

Examinations were conducted on male subjects aged 23—45 with high vestibular resistance to motion sickness under terrestrial conditions and high tolerance of weightlessness during flights.

Three basic components of the vestibular analyzer were studied:

1. somatic (duration of postnystagmus)
2. autonomic (pulse rate, perspiration, skin color)
3. sensory (subjective illusions, illusions of counterrotation).

It was revealed that 18.2% of the subjects had latent forms of motion sickness during rotational tests under conditions of stabilized weightlessness. In this group, the duration of counterrotational illusion was prolonged, as was postrotational nystagmus by 2—5 sec compared to horizontal flight

data, paleness or redness of facial skin was apparent, and moderate hyperhydrosis was noted as were illusions of changed body position with the eyes closed. Increased salivation and worsened subjective feelings were also noted.

Vestibulo-autonomic discomfort was not observed in the remainder of subjects. The duration of counterrotational illusion and postrotational nystagmus was shortened by 4—6 sec in the majority of subjects, while in others these indices were not shortened.

At the beginning of rotation in the period of transition from positive G to weightlessness during the second stage, tolerance of angular accelerations during stabilized weightlessness revealed 22.2% more cases of latent motion sickness. In these subjects, the duration of counterrotational illusions increased as compared to their duration during stabilized weightlessness; pronounced paleness of facial skin, lip cyanosis, pronounced, general hyperhydrosis, nausea, hypersalivation, and discomfort in the area of the stomach were observed. The termination of nystagmus could not be fixed relative to the onset of accelerations following weightlessness.

In the opinion of the authors, symptoms of motion sickness during ro-

tational tests under conditions of stabilized weightlessness were found for the following reasons: first, under conditions of weightlessness the function of the otolithic component of the vestibular apparatus was modified due to the unusual position of the otoliths (floating state) which led to increased sensitivity to angular accelerations during rotation of the chair; second, manifestations of Coriolis accelerations as a result of Barani chair rotation during parabolic flight.

In those cases when the rotational test was completed in the period of transition from acceleration to weightlessness, additional adequate irritation of the otoliths associated with a sharp switch from a "plus" stimulus to a "minus" took place, facilitating the more rapid accumulation of Coriolis accelerations.

Therefore, the use of a modified rotational test under short-term weightlessness conditions reveals latent forms of motion sickness even in people with high resistance and can be used for prognostic purposes.

Use of the rotational test in the period of transition from acceleration to weightlessness reveals latent forms of motion sickness most effectively.

[W.A. No. 22; ATD Report 66-116]

SUB CODE: 06 / SUBM DATE: 00May66

ACC NR: AF6033399 SOURCE CODE: UR/0293/66/004/005/0755/0767

AUTHOR: Volynkin, Yu. M.; Akulinichev, I. T.; Vasil'yev, P. V.; Voskresenskiy, A. D.; Kas'yan, I. I.; Maksimov, D. G.

ORG: none

TITLE: Some data on the condition of cosmonauts during the flight of the Voskhod-1 spacecraft

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 5, 1966, 755-767

TOPIC TAGS: manned spacecraft, space physiology, space medicine, human physiology, cardiovascular system, nervous system, vestibular analyzer/Voskhod 1 spacecraft

ABSTRACT: A diagram of the biomedical monitoring parameters and some results of a further statistical analysis of the Voskhod-1 flight are presented in the following figures and tables. As in other discussions of this flight, the general conclusion was that none of the observed physiological shifts were of a pathological nature, and therefore, were reversible. The most significant finding of the flight was a confirmation of the possible specific effect of weightlessness on the statokinetic

Card 1/6 UDC: 629.198.61

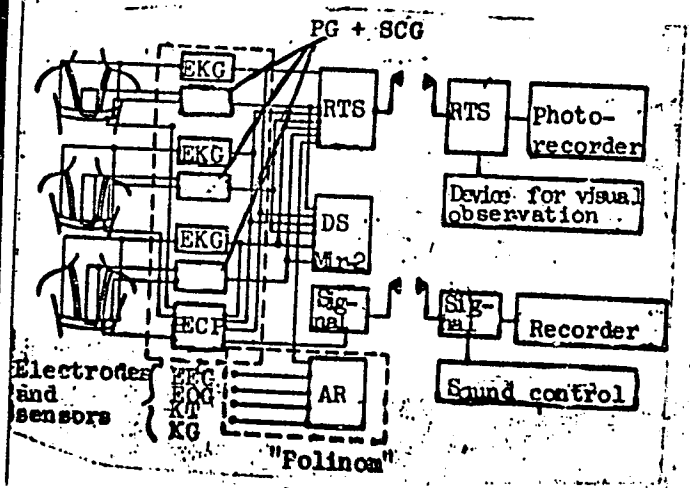

Fig. 1. Block diagram of physiological parameters recorded during the flight of Voskhod-1

EKG - Electrocardiogram; PG, SCG - pneumogram plus seismocardiogram; EEG - electroencephalogram; PECP - pulmoelectrocardiophone; EOG - electrooculogram; KT - coordination test; KG - kinetogram; RTS - radiotelemetry system; DS-Mir-2 - data storage unit; AR - amplifier-readout.

Cosmonauts	Physiological index	Before flight						After flight	
		6.X	8.X	11.X	4 hr Prelaunch	5 min Prelaunch	1 min Prelaunch	1st day	15 th day
		1964			12. X 1964				
V. M. Komarov	Pulse	76	68	72	87	89	89	80	68
	Respiration	6	12	10	16	23	20	11	10
	Arterial pressure	115/75	115/70	120/75	—	—	—	115/80	115/75
K. A. Feoktistov	Pulse	80	84	80	78	86	97	84	72
	Respiration	12	16	18	21	20	21	16	11
	Arterial pressure	110/75	105/75	125/85	—	—	—	105/85	115/80
B. B. Yegorov	Pulse	72	84	64	81	86	95	84	68
	Respiration	14	14	14	18	25	21	10	15
	Arterial pressure	100/70	105/85	120/70	—	—	—	120/80	110/68

Table 1. Dynamics of the pulse rate, respiration rate, and arterial pressure of the Voskhod-1 cosmonauts before, during, and after the flight (from the data of M. D. Nikitin et al).

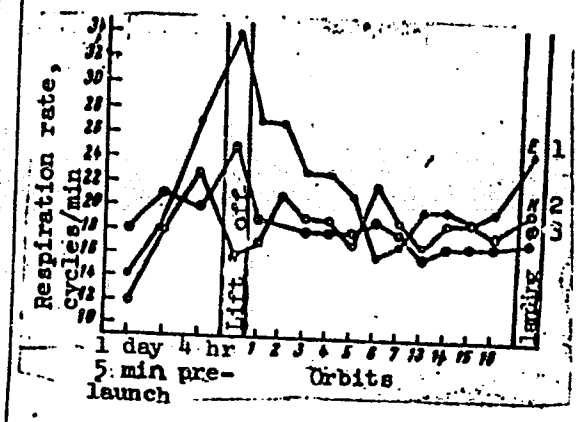

Fig. 2. Dynamics of the average respiratory rates of V. M. Komarov (2), K. P. Feoktistov (3), and B. B. Yegorov (1) before, during, and after the Voskhod-1 flight

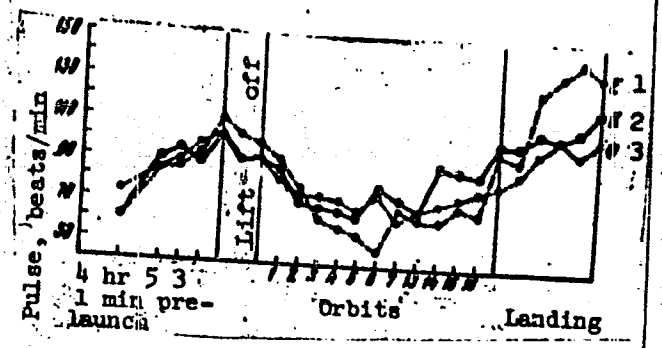

Fig. 3. Dynamics of the average pulse rates of B. B. Yegorov (1), V. M. Komarov (2), and K. P. Feoktistov (3), before, during, and after the Voskhod-1 flight

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ACC NR: AP6033399

Parameters.	Cosmonauts	2.5 hr before launch	Orbits										
			1	2	3	4	5	6	7	13	14	15	16
P-Q, sec	V. M. Komarov	0,12	0,10	0,11	0,10	0,12	0,11	0,11	0,11	0,10	0,10	0,10	0,10
	K. P. Feoktistov	0,15	0,14	—	0,13	0,16	0,13	0,16	0,14	0,11	0,12	0,12	0,12
	B. B. Yegorov	0,12	0,12	0,12	0,13	0,13	0,14	0,14	0,16	0,10	0,12	—	0,10
Q-T, sec	V. M. Komarov	0,34	0,34	0,37	0,36	0,37	0,38	0,35	0,38	0,39	0,36	0,34	0,34
	K. P. Feoktistov	0,36	0,36	—	0,36	0,37	0,37	0,37	0,42	0,38	0,39	0,37	0,38
	B. B. Yegorov	0,33	0,34	0,37	0,38	0,39	0,41	0,44	0,39	0,40	0,38	—	0,37
R-R, sec	V. M. Komarov	0,69	0,61	0,78	0,70	0,83	0,99	0,61	0,76	0,69	0,71	0,72	0,75
	K. P. Feoktistov	0,75	0,69	—	0,82	0,88	0,91	0,90	0,96	0,67	0,82	0,80	0,76
	B. B. Yegorov	0,67	0,69	0,73	0,88	0,98	1,13	1,24	0,96	1,03	0,87	—	0,90
Systolic index	V. M. Komarov	49,9	57,7	48,7	51,7	43,7	40,0	58,2	50,7	45,0	51,1	47,2	45,3
	K. P. Feoktistov	47,6	62,9	—	44,6	42,4	40,0	41,3	43,3	44,2	47,9	46,5	46,8
	B. B. Yegorov	49,2	58,6	50,7	43,4	38,7	36,2	36,8	40,1	39,2	44,2	—	41,0

Table 2. Some indices of the cardiac activity of V. M. Komarov (1), K. P. Feoktistov (2), and B. B. Yegorov (3) before and during the flight of Voskhod-1

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Orbits	V. M. Komarov			K. P. Feoktistov			B. B. Yegorov		
	M, sec	σ, sec	C, %	M, sec	σ, sec	C, %	M, sec	σ, sec	C, %
5 min before	0,68	0,07	10,5	0,72	0,076	10,56	0,70	0,073	10,50
1	0,72	0,09	12,8	0,75	0,031	4,15	0,69	0,074	10,74
3	0,87	0,098	11,26	0,84	0,084	9,96	0,94	0,109	11,55
6	0,82	0,075	9,14	0,86	0,074	7,66	1,31	0,044	3,36
13	0,87	0,038	4,34	0,93	0,091	9,80	1,02	0,067	6,58
16	0,74	0,043	5,82	0,81	0,053	6,50	0,96	0,082	8,60

Table 3. Results of a statistical analysis of R-R intervals for V. M. Komarov (1), K. P. Feoktistov (2), and B. B. Yegorov (3) before and during the Voskhod-1 flight

analyzer and its interaction with other analyzers leading to the possible development of prolonged spatial disorientation illusions and prolonged vestibuloautonomic reactions which decrease the work capacity of cosmonauts. Orig. art. has: 4 figures and 4 tables.

SUB CODE: 06/ SUBM DATE: 26May66/ ORIG REF: 010/ OTH REF: 001/ ATD PRESS: 5100

Card 6/6

ACC NR: AP7005701 SOURCE CODE: UR/0216/67/000/001/0104/0115

AUTHOR: Kas'yan, I.I.; Vasil'yev, P.V.; Maksimov, D.G.; Akulinichev, I.T.; Uglov, A.Ye.; Baykov, A.Ye.; Chekhonadskiy, N. A.

ORG: none

TITLE: Some cardiovascular and respiratory system reactions of the cosmonauts during the orbital flight of the Voskhod-2 spacecraft

SOURCE: AN SSSR. Izvestiya. Seriya biologicheskaya, no 1, 1967, 104-115

TOPIC TAGS: weightlessness, cardiovascular system, respiratory system, electrocardiography, psychologic stress, SPACE PHYSIOLOGY

ABSTRACT:

Cardiovascular and respiratory system data for A. A. Leonov and P. I. Belyayev monitored during the March 18, 1965 Voskhod-2 spacecraft flight and extravehicular excursion is analyzed. The significance of the R-R, PQ, QT and QRS intervals and the P, R, S and T-waves of the EKG's was determined. Pulse rate, respiration frequency, and systolic index were found on the basis of pneumogram data. The EKG and pneumogram data were mathematically processed for each orbit. Findings show that under conditions of weightlessness the general condition of the cosmonauts was not marked

Card 1/2 UDC: 612:523

ACC NR: AP7005701

by any significant disorders with the exception of some functional shifts in the cardiovascular system: marked reduction of heart contraction frequency, sometimes lower than initial values; more marked fluctuation of time intervals and amplitudes of EKG waves; and, in the case of P. I. Belyayev, the presence of ventricular extrasystoles. Analysis of the respiratory cycle phases and their coefficients of variation indicates relative stability of respiratory functions. Postflight medical examinations did not disclose any significant functional system shifts. Pulse rate increases by 12 to 16 beats/min, systolic arterial pressure increases by 10 to 15 mm Hg, and the diastolic pressure remained practically the same. Respiration frequencies corresponded to initial values. The most pronounced cardiovascular and respiratory reactions were displayed by Belyayev during the second orbit when his companion returned to the spacecraft and during the seventeenth orbit when he operated the controls manually. The highest reactions displayed by Leonov were during the second orbit at the time of his extravehicular excursion and return to the spacecraft. These shifts are attributed to the emotional strain involved in performing the most difficult tasks of the flight mission. The medical data show that the orbital flight and extravehicular excursion did not produce any sharp changes in the basic functional system and did not reduce the work capacities of the cosmonauts. Orig. art. has: 7 figures and 1 table.

SUB CODE: 06/ SUBM DATE: 26Apr66/ ORIG REF: 006/ OTH REF: 003/ [06]
ATD PRESS: 5116

Card 2/2

RUDKOV, G.V., inzh. (g.Zhdanov); KAS'YAN, N.G., inzh. (g.Zhdanov)

Improving the efficiency of the TE3 diesel locomotive. Zhel. dor. transp. 47 no.1:59-60 Ja '65. (MIRA 18:3)

KAS'YAN, M., doktor tekhn.nauk, prof.

Results of a great work. Prom.Arm. 6 no.10:81-82 O '63. (MIRA 17:1)

KAS'YAN, M.V.; AKOPOV, A.A.

Tuff cutting. Izv.AN Arm.SSR.Ser.FMMT nauk 1 no.6:525-536 '48.
(MLRA 9:8)

1. Institut stroitel'nykh materialov i sooruzheniy Akademii nauk Armyanskoy SSR.

(Stone cutting)

KAS'YAN, M. V.

36703. Nekotoryye Zamechaniya O Geometrii Rezitsa. Sbornik Trudov Tbidis. In-Ta Inzhenerov Zh-D Transporta. Im. Lenina, XVII-XVIII, 1948, s. 91-129. Bibliogr: 18 Nazv.

SO: Letopis' Zhurnal'nykh Statey, Vol. 50, 1949

KAS'YAN, M.V.; TER-AZAR'YEV, I.A.

Obtaining slabs from Artik tuff by means of a circular saw. Izv. AN Arm.SSR.Ser.FMET nauk 4 no.6:481-487 '51. (MLRA 9:8)

1. Institut stroitel'nykh materialov i sooruzheniy AN Armyanskoy SSR.

(Artik--Stone cutting)

KAS'YAN, M.V., professor.

Deformed shavings. Trudy Azerb.ind.inst. no.7:63-73 '54.(MLRA 9:9)
(Metal cutting)

KAS'YAN, M.V.; TER-AZAR'YEV, I.A., kandidat tekhnicheskikh nauk.

Problem of evaluating the workability of natural stones. Mekh.stroi.11 no.10:28-31 O '54. (MLRA 7:11)

1. Chlen-korrespondent Akademii nauk Armyanskoy SSR (for Kas'yan)

(Building stones)

KAS'YAN M.V.

KASK'YAN, M., professor; MNDZHOYAN, K., kandidat tekhnicheskikh nauk.

Strip sawing of marble. Stroi.mat., indel.i konstr. 1 no.6:15-16 Je '55. (MLRA 9:1)

1.Chlen-korrespondent AN Armyanskoy SSR (for Kas'yan)
(Marble industry and trade)

COUNTRY : USSR
CATEGORY : Cultivated Plants. Fruits. Berries. Nuts. Tea. M

ABS. JOUR. : RZhBiol., No. 1, 1959, No.1802

AUTHOR : Solodovnik; Kas'yan; Obodovskaya; Gonchar enko
INST. : Cherkassk State Pedagogical Institute.
TITLE : On Studying the Effect of Fertilizers on Growth and Frost Stability of Some Pear varieties During Young Age.

ORIG. PUB. : Nauk. zap. Cherkas'k. derzh. ped. in-t, 1957, 11, 275-288

ABSTRACT : Reported are results of a three year study of the effect of the humus horizon and organo-mineral fertilizer mixtures, introduced during setting of the plants, on growth, development, duration of the vegetation period and winter stability of pear plants. Noted is the positive effect of introducing a humus soil horizon and fertilizers on breeding, growth, and winter stability of plants after setting; the authors recommend, however, that the immediate upper layer of soil near the roots at a depth of 10-15 cm be without fertilizer. The autumn variety

CARD: 1/2

AKOPOV, Robert Vladimirovich,; KAS'YAN, M.V., red.; TER-AZAR'YEV, I.A., red.; AZIZBEKYAN, L.A., tekhn. red.

[Geometry of stonecutting tools] Geometriia rezhushchego instrumenta pri rezanii kamnia. Erevan, Izd-vo AN Armianskoi SSR, 1958. 173 p. (MIRA 11:11)

(Stonecutting--Equipment and supplies)

KAS'YAN, M.V.

PHASE I BOOK EXPLOITATION SOV/3688

Akademiya nauk SSSR. Institut mashinovedeniya. Komissiya po tekhnologii mashinostroyeniya. Seminar po kachestvu poverkhnosti

Kachestvo poverkhnosti detaley mashin, sbornik 4. Tekhnologicheskiye faktory obrabotki. Metrologiya i pribory. Ekspluatatsionnyye svoystva poverkhnostnogo sloya (Surface Quality of Machine Parts, Collection of Articles, No. 4. Processing Factors in Machining. Metrology and Instruments. Operational Properties of the Surface Layer) Moscow, Izd-vo AN SSSR, 1959. 291 p. (Series: Its: Trudy) Errata slip inserted. 3,200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya.

Resp. Ed.: P.Ye. D'yachenko, Professor; Ed. of Publishing House: G.B. Gorshkov; Tech. Ed.: T.P. Polenova.

PURPOSE: This collection of articles is intended for technical personnel concerned with the quality of surface finishes of machine parts.

COVERAGE: This collection of articles deals with problems of surface roughness and the effect of surface roughness on the wear and strength of machine parts. Among the topics discussed are the development of international standards for surface roughness, the effect of cutting feeds and cutting-tool vibration on the surface roughness of machined parts, the effect of lay direction on the wear of plane friction surfaces, methods and instruments for measuring surface roughness, and the processing of profilograms of finished surfaces. No personalities are mentioned. References follow several of the articles.

MUSTAFAYEV, Abdulali Dzhabar ogly, dotsent, kand.tekhn.nauk; KAS'YAN, M.V., akademik, prof., doktor tekhn.nauk, red.; AL'TMAN, T.B., red.izd-va

[Technology of the manufacture of equipment for petroleum industry] Tekhnologiia proizvodstva neftezavodskogo oborudovaniia. Baku, Azerbaidzhanskoe gos.izd-vo neft. i nauchno-tekhn.lit-ry. Pt.1. 1959. 319 p. (MIRA 13:1)

1. AN Armyanskoy SSR (for Kas'yan).
(Petroleum industry—Equipment and supplies)

1.1100

26218
S/173/60/013/006/001/002
A114/A133

AUTHOR: Kas'yan, M. V.

TITLE: Stabilization conditions of the metal cutting process

PERIODICAL: Akademiya nauk Armyanskoy SSR. Izvestiya. Seriya tekhnicheskikh nauk, v. 13, no. 6, 1960, 47 - 50

TEXT: Investigations showed that the method of choosing an economic speed in mechanical metal cutting should be revised because whereas the depth and degree of deformation, power consumption and cutting force increase, the total life of the cutting tool decreases, since the number of possible redressings is reduced. This happens especially when heat treatment is necessary, during which the strain and the recrystallization process of the surface, caused by the cutting and shaping process, decreases. In order to get a highly efficient cutting tool the following calculations are suggested: a) Feed S mm/revolutions will be determined, in accordance with the given class of surface finish and the recommended tool geometry. b) Depth of cut t is determined by the following equation, taking into consideration the available spindle power, the number i of all tools working simultaneously and the value S_o:

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Stabilization conditions of the metal cutting process

$$t = \sqrt[y_N]{\frac{N}{iN_1 S_o^{x_N *}}} \text{ mm}$$

where N = useful capacity, N_1 = unit power and x_N and y_N = factors depending on the kind of metal being machined; this depth of cut leads to a full utilization of the useful capacity of the machine tool; *[Abstracter's note: Misprint in the original text because N should be an index]. c) The cutting speed is determined with the aid of the values S_o and t at the given tool life T by equation:

$$\frac{C}{T^m S^{xv} t^{yv}} \text{ m/min}$$

The author points out, however, that the main deficiency connected with the use of the maximum deformation conditions remains, even if computers are used to facilitate the work of technologists. Investigations showed that other calculation methods will ensure optimum machining conditions of steel parts. Based on the correlation between the cutting speed, degree of deformation of the layer being cut off, chip-formation stresses, roughness, depth of deformation beyond the cutting line, tool life and power capacity of the cutting process, the author suggests a

Stabilization conditions of the metal cutting process

new, more expedient method of selecting the cutting conditions which is to be effected in the following succession: 1. Increasing the feed and 2. Determining the cutting speed by the curve "deformation of the layer being cut - cutting speed", in the zone of the descending part of the curve, i.e. it should have a speed of 100 - 180 m/min. The result will be: a) the chip-formation stress is reduced to a minimum and therefore the surface finish improves in regard to the reduced height of the crests and the depth and degree of deformation; b) the formation of growth is reduced and c) the power input is noticeably lowered. When steel is machined the cutting work on the path of one mm can be expressed:

$$P_z = P_{ch}\left(1 - \frac{1}{\Delta}\right) + W_b + W_f$$

where P_z = tangential component of the cutting force, P_{ch} = chip-formation stress, Δ = shrinkage coefficient (of chips), W_b = friction of the back of the tool on the cutting surface, and W_f = friction of the chip being formed on the front of the tool. [Abstracter's note: subscripts ch (chip-formation), b (back) and f (front) are translations from the Russian st (struzhkoobrazovaniye), zg (zadnyaya gran') and pr (perednyaya gran')]. As a characteristic property, when operating in the optimum speed range appears the stabilization process and, as a result, a

Stabilization conditions of the metal cutting process

smooth working of the system tool - workpiece. The application of this new method saves power and ensures a longer tool life.

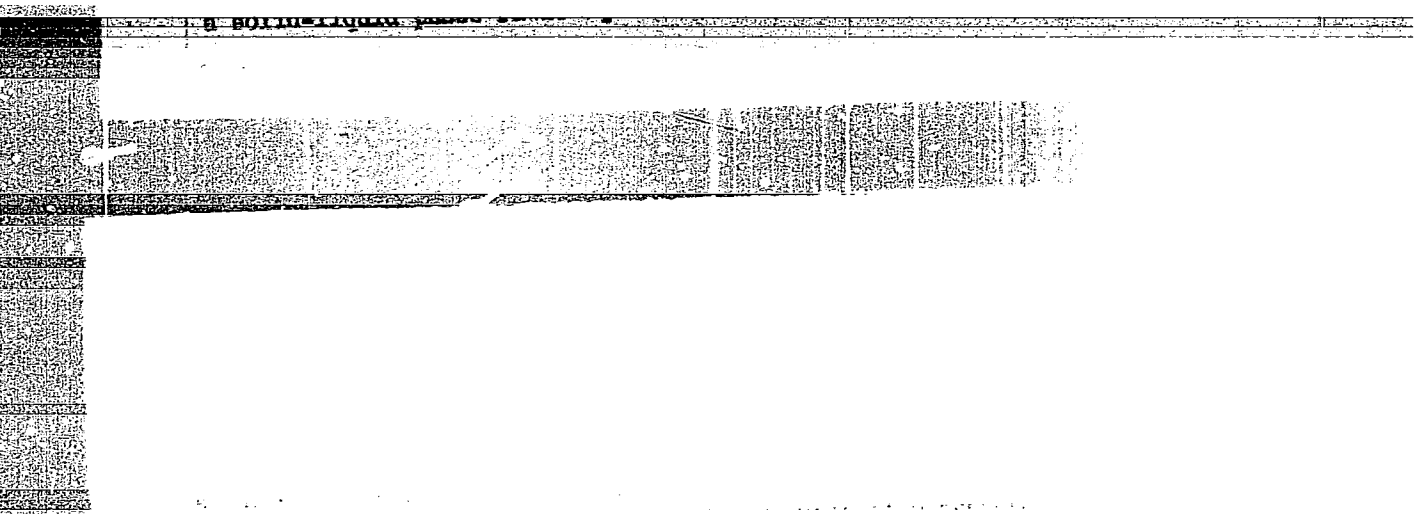
Card 4/4

MARTIROSYAN, Rafik Balabekovich, kand. tekhn. nauk; KAS'YAN, M.V., akademik, red.; KOLESNIKOVA, N.I., red.izd.; AKHIRYAN, Ye., tekhn. red.

[Metal cutting as a process of plastic deformation of compression and shear] Rezanie metallov kak protsess plasticheskoi deformatsii szhatiia i sdviga. Erevan, Armgosizdat, 1963. 115 p. (MIRA 16:6)

1. Akademiya nauk Armyanskoy SSR (for Kas'yan).
(Metal cutting) (Deformations (Mechanics))

TOPIC TAGS: powder metal, powder metal production, iron, iron ore, cast iron cuttings



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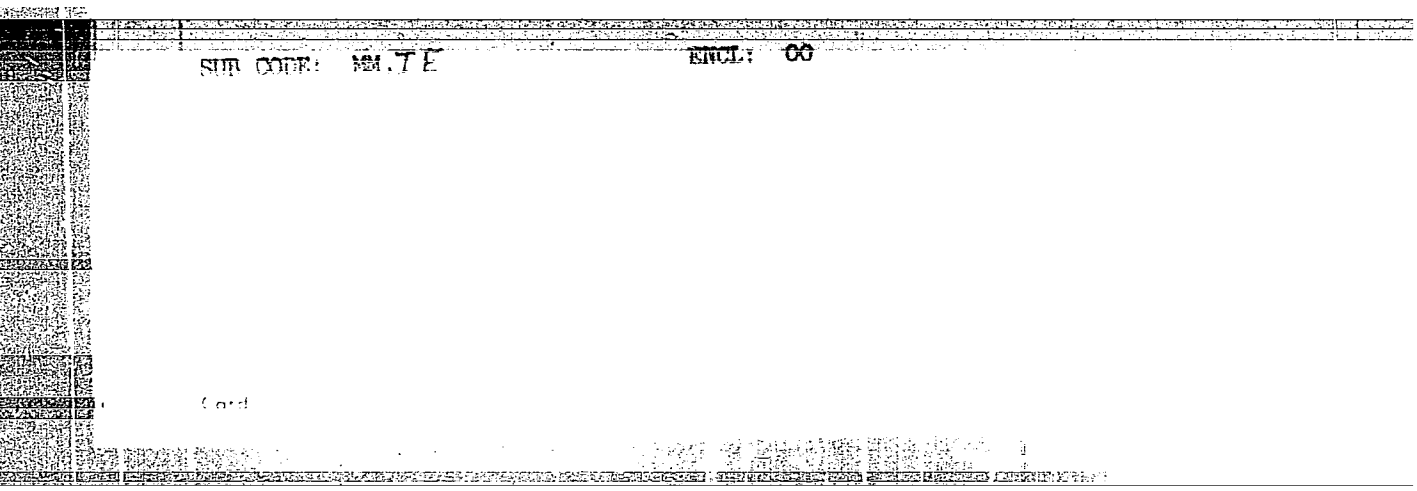
a current strength of +-5 a, and a solid-liquid ratio equal to [illegible]
seperation. free carbon, silicon, and compounds of manganese, sulfur, and

[illegible] cooling. The carbon content of the powder [illegible]



KAS'YAN, M.V.; TER-AZAR'YEV, I.A.

Thermal phenomena during stonecutting. Izv. AN Arm. SSR. Ser. tekh. nauk 18 no.3:25-32 '65. (MIRA 18:8)

1. Nauchno-issledovatel'skiy institut kamnya i silikatov Soveta narodnogo khozyaystva ArmSSR.

S/084/60/000/006/003/020
A104/A029

AUTHORS: Gilenko, G. and Kas'yan, O., Graduate Engineers

TITLE: Manual Labor Becomes a Thing of the Past

PERIODICAL: Grazhdanskaya Aviatsiya, 1960, No. 6, pp. 3 - 4.

TEXT: The article refers to the resolution passed by the General Assembly of the TsK KPSS in June 1959 demanding an overfulfilment of the Seven-Year-Plan and full automation of the industry. The following equipment was designed and put into practical use by the workshop supervised by Ferenets: an installation for creolin rinsing of aircraft, yearly economy 42,700 rubels; a hoisting device for heavy aircraft units operated from the main hydrostation; power is supplied by a 109A hydraulic pump driven by a 1,5 kw electromotor and supplying АМГ -10 (AMG-10) oil; 50 kg/cm^2 pressure is maintained automatically by hydraulic pumps fitted with И -12 (I1 - 12) operation signalizers; the spliging of wooden floors is performed by a hydraulic press at 0,35 - 1 kg/cm^2, the press consists of three sections and is operated from the main board; pressure is derived from I1 - 12 cylinders and the entire machine operated from a hydrostation analogous to that of the

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Manual Labor Becomes a Thing of the Past

hoisting device. Dismantling of lower units and landing gear traverses and other operations are carried out by hydraulic engines. As some of these operations require a 25 - 30 ton force, a hydraulic-multiplier has been attached to the standard hydraulic power station, allowing a stress increase of up to 250 kg/cm^2. All mechanical parts of these installations were supplied by ИЛ-14 (Il-14), ИЛ-12 (Il - 12) and Ли - 2 (Li - 2) aircraft. The reducer of a СКД -2 (SKD-2) starter and a 1,7 kw electromotor are used for mechanical tightening of crankshaft bolts. A major economy was achieved by introduction of automatic lathes; they reduced the cost of 1,000 linings from 290 to 60 Rubels and that of bolts from 400 to 61 Rubels (Photograph). The following personnel have taken active part in the automation program: shop managers Plakhotnyy, Petrenko and Zhukov; Graduate Engineers Vishnyak, Pinchuk and Reznik; Foremen Boyko and Tishchenko, Fitters Karlash, Khomenko and Klemba. Photographs on Page 3 show the Foreman D. Gomin-Makukha pressing the bearing into the valve rod and the Outstanding Worker of Communist Labor, Fitter V. Kudryavchenko dismantling a wheel with the aid of an automatic device. The photograph on Page 4 shows the Fitter A. Mel'nichenko lifting a supercharger from the trolley. There are 4 photographs.

Card 2/2

BURMISTROV, S.I.; ROMANOVSKAYA, L.G.; KAS'YAN, O.S.

Derivatives of p-sec-butylbenzenesulfonic acid. Zhur.ob.khim. 33 no.7:2380-2383 Jl '63. (MIRA 16:8)

1. Dnepropetrovskiy khimiko-tekhnologicheskiy institut.
(Benzenesulfonic acid)

AUTHOR: Kas'yan, R. M.

Yerevan, [illegible]

ACCESSION NR: AR5013006

KAS'YAN, S.M., inzhener.

Installing SM-61 screens. Mekh.stroi. 13 no.10:28-29 O '56. (MLRA 9:11)

(Screens (Mining))

KAS'YAN, S.M., inzh.

Kolomoyevskiy rubble and crushed stone quarry. Mekh. stroi. 18 no.11:13-14 N '61. (MIRA 16:7)

(Saksagan' Valley—Quarries and quarrying)

KONDRATYUK, Ye.M.[Kondratiuk, IE.M.], otv. red.; BILOKIN', I.P., zam. otv. red.; BURACHINSKIY, O.M. [Burachyns'kyi, O.M.], red.; ZHARENKO, N.Z., red.; KOLOMIYETS', I.O. [Kolomiiets', I.O.], red.; KOKHNO, M.A., red.; KHARKEVICH, S.S.[Kharkevych, S.S.], red.; CHOPIK, V.I.[Chopyk, V.I.], red.; KAS'YAN, S.M., red.

[Acclimatization and introduction of new plants] Aklimatizatsiia i introduktsiia novykh roslyn. Kyiv, Naukova dumka, 1965. 221 p. (MIRA 18:5)

1. Akademiya nauk URSR, Kiev. Botanichnyi sad.

MAZURMOVICH, B.N., otv. red.; BOSHKO, G.V., red.; GUSHCHA, G.I., red.; SMORGORZHEVSKAYA, L.A., red.; FEDORENKO, I.A., red.; ANDRIYCHUK, M.D., red.; KAS'YAN, S.N., red.

[Parasites and parasitoses in man and animals] Parazity i parazitozy cheloveka i zhivotnykh. Kiev, Naukova dumka, 1965. 411 p. (MIRA 18:9)

1. Akademiya nauk URSR, Kiev. 2. Kiyevskiy gosudarstvennyy universitet (for Mazurmovich). 3. Institut zoologii AN Ukr.SSR (for Boshko).

DANIYELYAN, A.A.; KAS'YAN, T.V., spets. red.

[High-efficiency machining of parts on copying lathes] Vysokoproizvoditel'naia obrabotka detalei na tokarno-kopiroval'nykh stankakh. Erevan, Aiastan, 1964. 99 p. (MIRA 18:8)

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S/837/61/049/000/005/011
B102/B104

AUTHORS: Kas'yan, V. A., Kot, M. V.

TITLE: The electrical properties of indium antimonide films

SOURCE: Kishinev. Universitet. Uchenyye zapiski. v. 49, 1961, 69-77

TEXT: InSb crystals would be a good material for producing Hall emf transmitters if their conductivity were not so high. Therefore it would be of great advantage to have InSb in the form of films with properties not differing too much from those of the crystals. Until now the problem of making these has not been solved, but a rather promising approach to its solution is offered by a film production method described here. The best results were obtained using a 500 mg mixture of 70% In + 30% Sb evaporated from a graphite crucible by heat from a tungsten spiral. The vapor was condensed onto a hot (200-300°C) or cold (20°C) glass backing held in a nickel frame with provision for heating it to 500°C, the whole arrangement being contained in an evacuated glass tube. The glass base was pre-annealed at 400°C. This method made it possible, to obtain films

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of stoichiometric composition, but less easily on evaporating mono- or polycrystalline InSb. Conductivity and Hall coefficient were measured in the usual ways with silver or aquadag ohmic contacts, and the temperature dependences of these coefficients were compared as between films produced under different conditions. Additional annealing ($300^{\circ}C$) in vacuo of films condensed onto cold bases increased the mobility and reduced the free-carrier concentration. The carrier concentration of films condensed onto hot bases was not changed by annealing, but the mobility again was raised, this being due to a growth of the grain size. Thus the production of InSb films having carrier mobilities similar to those of polycrystalline InSb is only a question of grain size. Since oxygen forms electron traps, any sorption of air affects also the electric properties. The Hall coefficient of film $\leq 0.1\mu$ thickick depends on the magnetic field strength. There are 5 figures.

S/837/61/049/000/009/011
B102/B104

AUTHORS: Kas'yan, V. A., and Utusikova, N. G.

TITLE: Determination of the work function of indium antimonide films

SOURCE: Kishinev. Universitet. Uchenyye zapiski. v. 49, 1961, 112-113

TEXT: The work function of n-type InSb with a donor concentration of $10^{15}cm^{-3}$ is $\varphi = 4.57$ ev as determined by D. Haneman (J. Phys. Chem. Solids, 11, 205, 1959). The work function of n-type InSb films, produced by a method described at p. 69 in this volume, was now determined by measuring the contact potential difference between gold and the film. Anderson's method (Phys. Rev. 47, 958, 1935) was applied. The films investigated had a conductivity of 1 - 15 $(ohm \cdot cm)^{-1}$, $R_{Hall} \approx -50\ cm^3/coul.$, u_{Hall}=200-500 cm/v·sec and $n \approx 10^{17}cm^{-3}$. The samples were degasified at 300°C and the measurements were made at 10^{-7}mm Hg. The Au-InSb contact potential difference was proved to be independent of the film thickness in the range 0.2 - 0.9 μ. For such films φ was found to be 4.42±0.5 ev.
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S/837/61/049/000/009/011
B102/B104

Determination of the work function ...

There are 2 figures.

Card 2/2

81804

S/137/60/000/04/07/015

24.7700

Translation from: Referativnyy zhurnal, Metallurgiya, 1960, No. 4, p. 235 # 8376

AUTHORS: Kot, M.V., Kas'yan, V.A.

TITLE: Electric Conductivity and Secondary Emission of the Mg_3Sb_2 Compound in Thin Layers

PERIODICAL: Uch. zap. Kishinevsk. un-t, 1959, Vol. 39, pp. 55 - 62

TEXT: The authors investigated the electric conductivity σ and the secondary emission of thin Mg_3Sb_2 layers (0.2-0.5 μ), obtained on cold (20°C) and heated (up to 200°C) glass backings by evaporation of massive alloys, and by the Vekshinskiy method. To prepare Mg_3Sb_2, the authors used spectrally pure Mg and Sb containing $\leq$ 0.001% of admixtures; σ was measured by the voltmeter-ampèremeter method. The secondary emission was studied by conventional methods. It is shown that, only at a slight Mg excess the thin Mg_3Sb_2 layers formed oxidize more rapidly than Mg. The compound having a stoichiometric composition or an Sb excess is stable in a vacuum and in a dry air atmosphere. The resistivity of layers at room temperature in a vacuum is $\sim 10^4$ ohm cm and the energy gap is 1.0 ev. The sorption air reduces the resistivity of layers by several times.

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81804

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Electric Conductivity and Secondary Emission of the Mg_3Sb_2 Compound in Thin Layers

This is connected with the formation of surface acceptor levels. The coefficient of secondary emission at 20°C is 2.6. At a raise of the temperature to 200°C, the ohm value increases and attains 3.2. The speed of initial electrons corresponding to the maximum coefficient of secondary emission is ~500 ev. There are 9 references.

S. S.

Card 2/2

L 10056-63
EWT(1)/BDS/EEC(b)-2--AFFTC/ASD/ESD-3--IJP(C)
ACCESSION NR: AR3000376 S/0058/63/000/004/E066/E066

58

SOURCE: RZh. Fizika Abs. 4E44

AUTHOR: Kas'yan, V. A.; Kot, M. V.

TITLE: Production technology and electric properties of thin layers of indium antimonate with high electron mobility

CITED SOURCE: Tr. po fiz. poluprovodnikov. Kishinevsk. un-t, vyp. 1, 1962, 57-69

TOPIC TAGS: semiconductors, indium antimonate, thin layers, production technology

TRANSLATION: The structure and the electric properties of thin layer of In Sb obtained by the Vekshinskiy method, have been investigated. The structure of the layer was investigated as a function of the thickness of the layer, the substrate temperature during the sputtering time, and the substrate material. It was shown that the graininess of the layer is greatly influenced by the thickness of the layer and by the substrate temperature. The material of the latter has

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ACCESSION NR: AR3000376

not play an important role. Investigations of the temperature dependence of the electric conductivity (Sigma) and of the Hall constant (R) have shown that layers produced by this method have an n-type conductivity and a carrier concentration of approximately 1 sup 16 -- 10 sup 17 cm sup -3, and the dependence itself makes it possible to propose that only in the high-temperature region for [illegible] lower carrier concentrations, can intrinsic conductivity [illegible] the high-temperature region is approximately the same as [illegible] specimens in the range [illegible] -- 1.20 ev. The reproducibility [illegible] of the layers occurs [illegible] to a definite temperature, which [illegible] medium in which the specimen is placed. The temperature dependence [illegible] electron mobility Mu [illegible] calculated from the temperature curve [illegible] has a maximum (Mu equal 1000 Sq. cm./v.sec) at a certain temperature between 100 and 200 degrees K, which depends on the purity of the specimen. The largest values of Mu were observed in large-grain specimens. The dependence of Mu on the graininess indicates that Mu is greatly affected by the scattering of the carriers on the grain boundaries. The effect of a magnetic field on Sigma was investigated. The magnetic field appreciably influences the value of Sigma of a layer made at a substrate temperature near 4000 degrees C. The grain dimension affects both the value of the change in Sigma, and the temperature

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ACCESSION NR: AR3000376

dependence of the variation of Sigma in the magnetic field. This dependence is determined by the temperature dependence of Mu. An investigation of the influence of the atmosphere on Sigma has shown that it is appreciable only at thicknesses less than 0.5 Mu. This influence reduces to the occurrence of traps on the surface of the layer. For some specimens, the calculated number of surface states is of the order of 10 sup 10 -- 10 sup 11 cm sup -2.
Yu. Ogrin

DATE ACQ: 14May63 ENCL: 00 SUB CODE: PH

cs/ja
Card 3/3

KASYAN, V.A.

Some electrical and galvanomagnetic properties of films of indium arsenide. V. A. Kas'yan.

Concerning the influence of the structure of the layer on the value of the mobility of current carriers in films of indium antimonide. V. A. Kas'yan, M. V. Kot.

Dependence of effective mass of electrons and optical activation energy on the concentration of current carriers in mercury selenide. M. V. Kot, V. A. Mshenskiy.
(Presented by V. A. Kas'yan--15 minutes).

Report presented at the 3rd National Conference on Semiconductor Compounds, Kishinev, 16-21 Sept 1963

KAS'YAN, V.A.; KOT, M.V.

Some optical and electric properties of thin films of indium antimonide. Izv. vys. ucheb. zav.; fiz. no.5:14-20 '63. (MIRA 16:12)

1. Kishinevskiy gosudarstvennyy universitet.

L 18120-63 EWT(l)/EWG(k)/EWP(q)/EWI(m)/BDS AFFTC/ASD/ESD-3 Pz-4 JD/AT
S/0181/63/005/007/1979/1981

ACCESSION NR: AP3003898

AUTHOR: Kas'yan, V. A.

TITLE: Photoconductivity of thin layers of InSb

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 1979-1981

TOPIC TAGS: photoconductivity, In, Sb, temperature, film, impurity

ABSTRACT: The author has studied the temperature dependence of photoconductivity in films of InSb in the temperature interval 100-350K. It was found that at temperatures above 200K the photoconductivity is positive, and below this temperature it is negative. The spectral characteristics of the negative effect in massive material have two maximums (at 3.4 and 4.5 μ), whereas the spectral characteristics of positive photoconductivity display but a single maximum (at 6 μ). In the films of InSb studied no impurities were added (the In and Sb were spectrally pure), and it is thus concluded that the negative photoelectric effect in the films is due to specific structures in the thin layer. It is thought that the surface states must play an important part in the mechanism of photoconductivity. "In conclusion, the author expresses his sincere thanks to Docent M. V. Kot for advice and aid in the work, and also to M. P. Mikhaylova and Yu. V. Popov for participating in making the measurements." Orig. art. has: 2 figures.

Card 1/2

L 18120-63

ACCESSION NR: AP3003898

ASSOCIATION: Kishinevskiy gosudarstvenny*y universitet (Kishinev State University)

SUBMITTED: 18Oct62 DATE ACQ: 15Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 005 OTHER: 008

Card 2/2

L 3148-66 EWT(l)/EWT(m)/ETC/EWP(i)/EWG(m)/T/EWP(t)/EWP(b)/EWA(h) IJP(c)
RDW/JD/GS/AT

ACCESSION NR: AT5020490 UR/0000/64/000/000/0432/0445

AUTHORS: Kot, M. V.; Kas'yan, V. A.; Maronchuk, Yu. Ye.; Mahenskiy, V. A.; Simashkevich, A. V.

TITLE: The dependence of the electrical properties of thin layers of certain binary compounds upon thickness and upon the surrounding atmosphere

SOURCE: Mezhvuzovskaya nauchno-tekhnicheskaya konferentsiya po fizike poluprovodnikov (poverkhnostnyye i kontaktnyye yavleniya). Tomsk, 1962. Poverkhnostnyye i kontaktnyye yavleniya v poluprovodnikakh (Surface and contact phenomena in semiconductors). Tomsk, Izd-vo Tomskogo univ., 1964, 432-445

TOPIC TAGS: indium compound, mercury compound, cadmium compound, zinc compound, electric property, Hall constant, semiconductor, conductivity

ABSTRACT: The dependence of the conductivity, differential thermo-emf, and Hall constant upon thickness and the surrounding atmosphere was studied for thin layers of InSb, HgSe, HgTe, CdSe, ZnSe, and CdTe. The work was done to determine the effect of surface states on the electrical properties of semiconductors. Thin layers of the above compounds were prepared by vaporization of polycrystalline alloys or single crystals of these compounds, by the method of academician

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L 3448-66
ACCESSION NR: AT5020490 O

Vekshinskiy, and by vaporization of a mixture of the components from a single vaporizer (for InSb). The films represented polycrystalline layers with crystal dimensions of $\sim 10^{-5}$-10^{-4} cm. Examples of graphs of conductivity versus thickness and the effect of sorbed oxygen on conductivity are shown in Figs. 1 and 2 on the Enclosures. It was concluded that the dependence of electrical properties upon thickness for layers of InSb, HgSe, and HgTe was due to the dependence of effective mobility upon crystal size and the influence of surface states when thickness was reduced. For layers of CdSe, ZnSe, and CdTe, the dependence was due chiefly to the influence of surface states. Orig. art. has: 10 graphs, 1 table, and 14 formulas.

ASSOCIATION: none

SUBMITTED: 06Oct64 ENCL: 02 SUB CODE: SS

NO REF SOV: 009 OTHER: 002

Card 2/4

L 3448-66
ACCESSION NR: AT5020490 ENCLOSURE: 01

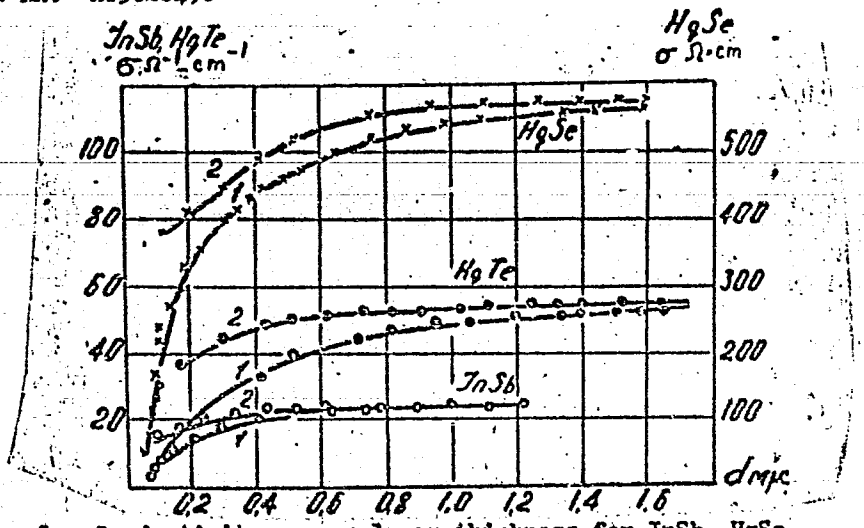

Fig. 1. Conductivity versus layer thickness for InSb, HgSe, and HgTe. 1—in oxygen atmosphere; 2—in vacuum of $\sim 10^{-5}$ mm Hg

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ACCESSION NR: AT5020490

ENCLOSURE: 02

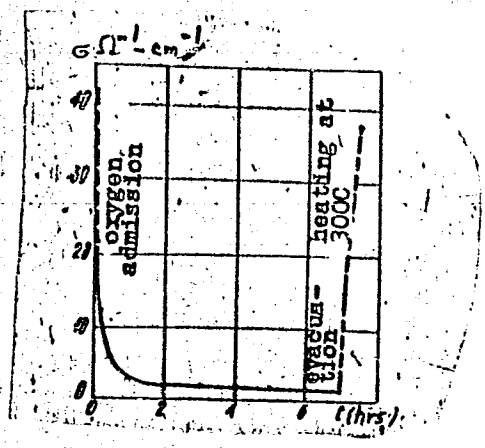

Fig. 2. Effect of sorbed oxygen on conductivity of CdSe layer

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ACCESSION NR: AP4041361 S/0048/64/028/006/0993/0995

AUTHOR: Kas'yan, V.A.; Kot, M.V.

TITLE: Concerning the influence of the structure of the layer on the current carrier mobility in indium antimonide films /Report, Third Conference on Semiconductor Compounds held in Kishinev 16 to 21 1963/

SOURCE: AN SSSR: Izvestiya. Seriya fizicheskaya, v.28, no.6, 1964, 993-995

TOPIC TAGS: semiconductor, thin film, electric conductivity, Hall effect, carrier mobility, grain size, indium antimonide

ABSTRACT: Thin films (0.5 to 2.5 microns) of n-type InSb were produced by a method described elsewhere (V.A.Kas'yan and M.V.Kot,Tr.fiz.poluprobodnikov,Kishinevsk.un.t 1,57,1962), and their conductivities, Hall constants, and thermal emf's were measured at temperatures from 130 to 500°K. By varying the thickness of the film and the temperature of the substratum during deposition, films were obtained with grain size (determined metallographically and electron-microscopically) from 10^{-4} to 10^{-6} cm and current carrier concentrations from 10^{16} to 10^{17} cm^{-3}. Of films with the same carrier concentration, those with the larger grain size were always the more

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ACCESSION NR: AP4041361

conductive. The Hall mobilities increased with increasing grain size from 500 to 1000 cm^2/V sec for the fine-grained films to 8000 to 10 000 cm^2/V sec for the coarse-grained ones. The thermal emf increased with increasing temperature to a maximum at 320°K, and at higher temperatures, with the onset of intrinsic conduction, it decreased sharply with increasing temperature. The ratio of electron to hole mobility was calculated from the temperature dependence of the Hall constant and the thermal emf. It was found to be from 8 to 10 in the coarse-grained films and from 1 to 4 in the fine-grained ones. The mean free path of electrons and holes in InSb crystals was estimated for crystals having the same range of carrier concentration as the films. The estimated mean free path of the electrons ranged from 3×10^{-6} to 6×10^{-6} cm, and that of the holes, from 1.9×10^{-7} to 2.5×10^{-7} cm. It is concluded that the grain boundaries in the films cannot appreciably affect the mean free path of the holes, but that they can and do influence that of the electrons. Orig. art.has: 3 formulas and 2 figures.

ASSOCIATION: Kishinevskiy gosudarstvenny*y universitet (Kishinev State University)

SUBMITTED: 00 ENCL: 00

SUB CODE: SS,IC NR REF SOV: 004 OTHER: 001

Card 2/2

S/0048/64/028/006/0996/0997

ACCESSION NR: AP4041362

AUTHOR: Kas'yan, V.A.

TITLE: Some electric and galvanomagnetic properties of indium arsenide films /Report, Third Conference on Semiconductor Compounds held in Kishinev 16-21 Sep 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no6. 1964, 996-997

TOPIC TAGS: semiconductor property, thin film, electric conductivity, Hall constant, indium arsenide

ABSTRACT: The electric conductivity and Hall constant of thin films of InAs were measured at temperatures from 130 to 650°K. The films were obtained by simultaneous vacuum deposition of the components; they measured 2 x 8 cm^2, and the thickness of each film varied continuously from 0.5 to 5 microns. The lattice constant of the crystallites was found by electron diffraction to be close to that of the bulk material. The grain size varied from tenths of a micron in the thin portions of a film to several microns in the thick portions. The Hall constant was negative and independent of the film thickness. The conductivity was greater in the thick portion of the film than in the thin portion. In a presumably typical film the conduc-

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ACCESSION NR: AP4041362

tivity increased from 7 (ohm cm)$^{-1}$ at a thickness of 0.5 microns to 80 (ohm.cm)$^{-1}$ at 5 microns. The reduction of the conductivity in the thin portions of a film is ascribed to the smaller grain size and consequent greater influence of contact resistance between the crystallites. Both the Hall constant and the conductivity were nearly independent of temperature at temperatures below 300 or 400°K; at higher temperatures the conductivity increased slightly and the Hall constant decreased with increasing temperature. The films had impurity concentrations from 5×10^{16} to 10^{19} cm^{-3}, and the Hall mobilities ranged from a few hundred to ten thousand square centimeters per volt second. InAs films with impurity concentrations less than 10^{17} cm^{-3} are recommended for use in Hall effect transducers because of the low temperature sensitivity. Orig.art.has: 2 figures.

ASSOCIATION: Kishinevskiy gosudarstvenny*y universitet (Kishinev State University)

SUBMITTED: 00 ENCL: 00

SUB CODE: SS, IC NR REF SOV: 001 OTHER: 002

Card 2/2

L 09226-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AR6019912 SOURCE CODE: UR/0275/66/000/002/B009/B009

AUTHOR: Kot, N. V.; Kas'yan, V. A.; Maronchuk, Yu. Ye.

TITLE: Dependence of electrical properties of thin layers of certain binary compounds on thickness and on the surrounding atmosphere

SOURCE: Ref. zh. Elektronika i yeye primeneniye, Abs. 2B71

REF SOURCE: Sb. Poverkhnostn. i kontaktn. yavleniya v poluprovodnikakh. Tomsk, Tomskikh un-t, 1964, 432-445

TOPIC TAGS: electric conductivity, Hall coefficient, thermal electromotive force, binary alloy, vacuum chamber, sorption, electron trapping, electron mobility

ABSTRACT: The dependence of conductivity, the Hall coefficient, and the differential thermal electromotive force on the thickness of a polycrystalline layer of binary compounds was investigated. An increase in conductivity with increase in thickness up to 0.5 to 0.8 micron was observed in n-type compounds. p-type conductivity in CdTe fell sharply with an increase in film thickness to 0.6 micron, and then remained virtually unchanged. Letting air or oxygen into a vacuum chamber immediately after the layers are obtained results in a reduction in conductivity for n-type films, and to an increase for p-type films. The surrounding atmosphere also had its effect on the differential thermal electromotive force. The reverse changes

Card 1/2 UDC: 539.293:541.412

L 09226-67

ACC NR: AR6019912

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in conductivity indicate that the sorbate oxygen forms surface levels which are electron traps in the n-type layers, and which play the role of acceptors in the p-type layers. Dependence of electrical properties on thickness in layers with great electron mobility (InSB, HgSe, HgTe) is discussed. I. V. [Translation of abstract]

SUB CODE: 20, 07

Card 2/2

L 07440-67 EWP(k)/EWT(m)/EWP(t)/ETI IJP(c) JD/HW
ACC NR: AP6030440 SOURCE CODE: UR/0420/66/000/006/0107/0109

402
8

AUTHOR: Lopatin, A. I.; Kas'yan, V. G.; Zhendubayev, V. N.

ORG: None

TITLE: A method for determining the shape of the workpiece during stamping 18

SOURCE: Samoletostroyeniye i tekhnika vozdushnogo flota, no. 6, 1966, 107-109

TOPIC TAGS: metal stamping, electronic measurement, metal deformation

ABSTRACT: One of the important factors in calculating the parameters of high-speed stamping is the shape taken by the blank during the stamping process. The shape of the workpiece may be determined by measuring the time for sequential operation of contact pickups mounted on a single level. When the blank is moving at a high rate of speed (several hundred meters per second) with a small curvature (especially in the initial moment of motion) the problem arises of measuring short time intervals with little difference between them. The pulse-count chronometer with capacitor time transformer shown in the figure is proposed for measurement of these time intervals. A start signal is sent from pickup P_1 through switch Sw_1 to charge capacitor C_1 from DC voltage source V. A signal is simultaneously sent to shaper S which generates a signal closing noncontact switch NS which operates reference frequency oscillator RFO and pulse

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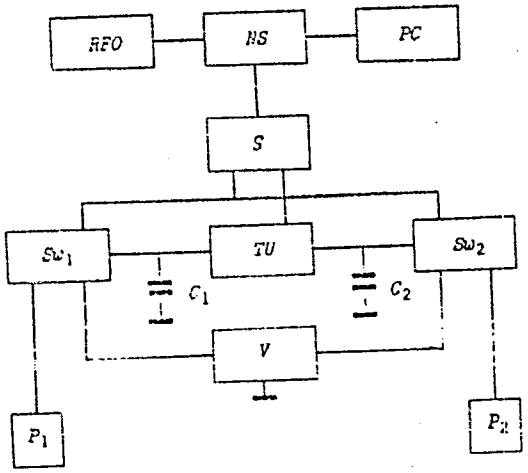
L 07440-67
ACC NR: AP6030440



counter PC. At this point PC begins to count pulses from RFO. With operation of pickup P_2, a stop signal is sent through Sw^1 terminating the charging of capacitor C_1 which is charged to voltage Φ in the time T_1 being measured. At the same time, a signal is sent through switch Sw_2 to charge capacitor C_2. This capacitor is charged until the voltage on its plates is equal to the voltage Φ on the plates of capacitor C_1. At this point the threshold unit TU operates and sends a signal through shaper S to switch NS terminating the pulse counting operation. If the capacitance of C_2 is larger than that of C_1, the time for charging C_2 will be greater than that required for charging C_1. Therefore this time interval may easily be measured with high accuracy using a pulse count chronometer with moderate reference frequency. A formula is given for determining the relative error in measurement of short time intervals using this type of instrument. It is found that the error is determined by the time transformation factor. Orig. art. has: 1 figure, 7 formulas.

SUB CODE: 13, 09/ SUBM DATE: none/ ORIG REF: 003

Card 2/2